

WARM-UP

① Solve the System:

$$\begin{cases} x - 2y + 3z = 12 \\ (-2) \cdot 2x - y - 2z = 5 \\ 2x + 2y - z = 4 \end{cases}$$

$$\begin{array}{r} x - 2y + 3z = 12 \\ 2x + 2y - z = 4 \\ \hline 3x \quad + 2z = 16 \end{array}$$

$$\begin{array}{r} x - 2y + 3z = 12 \\ -4x + 2y + 4z = -10 \\ \hline -3x \quad + 7z = -2 \end{array}$$

$$2(4) + 2y - 2 = 4$$

$$\begin{array}{r} 2y + 6 = 4 \\ -6 \quad -6 \end{array}$$

$$\frac{2y}{2} = \frac{-2}{2}$$

$$\boxed{y = -1}$$

$$\begin{array}{r} 3x + 2z = 16 \\ -3x + 7z = 2 \\ \hline 9z = 18 \\ \frac{9}{9} \quad \frac{9}{9} \\ \boxed{z = 2} \end{array}$$

$$3x + 2(2) = 16$$

$$3x + 4 = 16$$

$$\frac{3x}{3} = \frac{12}{3}$$

$$\boxed{x = 4}$$

WARM-UP

① Solve the System:

$$\begin{cases} x - 2y + 3z = 12 \\ 2x - y - 2z = 5 \\ 2x + 2y - z = 4 \end{cases}$$

② Find the determinant (look it up if you don't know) of the following matrix and, if possible, the inverse:

$$\begin{bmatrix} -2 & 3 \\ 4 & 1 \end{bmatrix}$$

$$A = \begin{bmatrix} -2 & 3 \\ 4 & 1 \end{bmatrix}$$

$$\det A = ad - bc$$

$$-2 \cdot 1 - 3 \cdot 4 = -14$$

$$\text{Inverse } \frac{1}{ad-bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$-\frac{1}{14} \begin{bmatrix} 1 & -3 \\ -4 & -2 \end{bmatrix} = \begin{bmatrix} -\frac{1}{14} & \frac{3}{14} \\ \frac{4}{14} & \frac{2}{14} \end{bmatrix} \approx \begin{bmatrix} 0.07 & 0.21 \\ 0.29 & 0.14 \end{bmatrix}$$

#1

$$\begin{bmatrix} 3 & 2 \\ 4 & 3 \end{bmatrix}, \begin{bmatrix} 3 & -2 \\ -4 & 3 \end{bmatrix}$$

$A \qquad A^{-1}$

$$A \cdot A^{-1} = I$$

$$\begin{bmatrix} 3 & 2 \\ 4 & 3 \end{bmatrix} \cdot \begin{bmatrix} 3 & -2 \\ -4 & 3 \end{bmatrix} = \begin{bmatrix} 3 \cdot 3 + 2 \cdot -4 & 3 \cdot -2 + 2 \cdot 3 \\ 4 \cdot 3 + 3 \cdot -4 & -2 \cdot 4 + 3 \cdot 3 \end{bmatrix}$$
$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad \text{yes}$$

Matrix Equations - Solving Systems

$$2x + y = 5$$

$$4x + 3y = 13$$

↓

$$\begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 13 \end{bmatrix}$$

$$A \cdot X = B$$

$$X = A^{-1} \cdot B$$

$$AX = B$$

$$X = A^{-1} \cdot B$$

$$A^{-1} = \frac{1}{2} \begin{bmatrix} 3 & -1 \\ -4 & 2 \end{bmatrix} = \begin{bmatrix} 1.5 & -0.5 \\ -2 & 1 \end{bmatrix}$$

$$X = \begin{bmatrix} 1.5 & -0.5 \\ -2 & 1 \end{bmatrix} \cdot \begin{bmatrix} 5 \\ 13 \end{bmatrix} = \begin{bmatrix} 1.5 \cdot 5 + -0.5 \cdot 13 \\ -2 \cdot 5 + 1 \cdot 13 \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$$

$$\begin{matrix} x=1 \\ y=3 \end{matrix}$$

$$2x + y = 5$$

$$5x + 3y = 14$$

$$\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 14 \end{bmatrix}$$

$$A \cdot X = B$$

$$X = A^{-1} \cdot B$$

$$A^{-1} = \frac{1}{2 \cdot 3 - 1 \cdot 5} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$A^{-1} = \frac{1}{1} \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$$

$$X = \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix} \cdot \begin{bmatrix} 5 \\ 14 \end{bmatrix}$$

$$= \begin{bmatrix} 3 \cdot 5 + -1 \cdot 14 \\ -5 \cdot 5 + 2 \cdot 14 \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$$

Sect. 3.6 #8, 9

Sect. 4.7 #1, 3, 4, 23-25(solve)

